

You may call me on my cell – 704-968-1725 or at home 704-896-9578 – between 6 a.m. and 10 p.m. if you have questions.

NAME: _____
BIO 112: Organisms, Evolution, and Ecosystems
Dr. Chris Paradise

Time Started: _____
Review 1
Spring 2008

Instructions: This review is worth 150 points (15% of your course grade) and will be due by 5:00 pm on Tuesday, 2/19/2008. No exceptions; late reviews will result in at least a 5% deduction. **You may not consult** any references or any other person while working on this review. Your signature at the bottom of the last page signifies that the work is yours alone and is pledged under the Honor Code. When you break the seal on the envelope you will have **three hours to complete the review**. Print legibly; I can only grade what I can read. For each question or part to a question, limit your answers to the space below each question, unless otherwise specified. Any part of your answer outside of the space provided **will not be graded**. **You may type** your answers separately, but use the same amount of space provided below each question. Each question is worth 15 points.

1. Discuss the two main components of the argument that Charles Darwin made in his treatise “On the Origin of Species.” Be sure to describe the evidence he used for each part of his argument.
2. Name three mechanisms of evolution and describe how they work together or against one another to cause **or** prevent changes in allele frequencies (15 pts).
3. Choose a species concept, define it, and describe it’s advantages and disadvantages related to its utility, ease of use, and generalizability.
4. Describe how relative and absolute dating methods are used to indicate the age of the Earth and the age of particular finds unearthed by paleontologists.

5. Answer the following questions regarding evolution

a. What is weak vs. strong selection?

b. What is a mechanism of evolution that decreases genetic variation and is a random process?

c. What is the relationship between fitness and natural selection?

d. What is a mechanism of evolution that increases genetic variation and is a random process?

6. Consider the following questions regarding speciation (15 pts):

a. What two things are necessary for speciation to occur when populations are distributed parapatrically?

b. Discuss the mode of natural selection that can lead to a speciation event.

c. What is one mechanism by which sympatric speciation can occur?

d. Can gene flow lead to a speciation event? Why or why not?

7. Study the cladogram of the even-toed ungulates on the next page. The approximately 240 species of this order include the majority of domesticated mammal species, including cattle, reindeer, camels, pigs, goats, and sheep. Recent molecular evidence has placed the whales and dolphins (formerly Order Cetacea) within this order. The terms on the right side of the figure are the names for four recognized suborders, and the terms in the middle are family names.

- a. Some scientists, to avoid the taxonomic implications of including the whales and dolphins within the even-toed ungulate group, continue to group them in two separate orders, but group them in a superorder. If we know that Cetacea and Hippopotamidae are each others' closest relatives, and yet we continue to group Cetacea outside of the even-toed ungulate group, then the even-toed ungulate group is no longer monophyletic – what is it?
- b. What group appears least derived on this cladogram?
- c. What evolutionary scenario explains how whales and dolphins can be grouped with the even-toed ungulates even though they have no toes? Consider, for instance, the common ancestor of whales, dolphins, and hippos.
- d. If a scientist wanted to construct a phylogeny of the ruminants (Ruminantia), which taxonomic group should he choose as his outgroup?



